

Flow Dependent Resources for the Lamprey River Designated Reach



University of New Hampshire
University of Massachusetts
Normandeau Associates, Inc.

October 7, 2005

Project Team

- **Normandeau Associates**
limnology, aquatic ecology, aquatic ecosystem restoration, impact assessment, permitting, wetland and terrestrial assessment.
- **University of New Hampshire**
Hydrology, hydraulics, geomorphology, ground water, water resources management, economics, financial possibilities, management plan
- **University of Massachusetts**
Instream flow, habitat modeling, fish ecology, fisheries management, field methods

IPUOCR Entities



Instream Public Uses, Outstanding Characteristics, and Resources (IPUOCR)

- **Navigation**
- **Recreation**
- **Fishing**
- **Storage**
- **Conservation/Open Space**
- **Maintenance and Enhancement of Aquatic and Fish Life**
- **Fish and Wildlife Habitat**
- **Rare, Threatened or Endangered (RTE)**
- **Water Quality Protection/Public Health**
- **Public Water Supply**
- **Pollution Abatement**
- **Aesthetic Beauty/Scenic**
- **Cultural**
- **Historical or Archaeological**
- **Community Significance**
- **Hydrological/Geological**
- **Agricultural**

Protected Instream Flows (PISF)



Flows that protect and maintain protected entities

Reason Why We Are Here Today

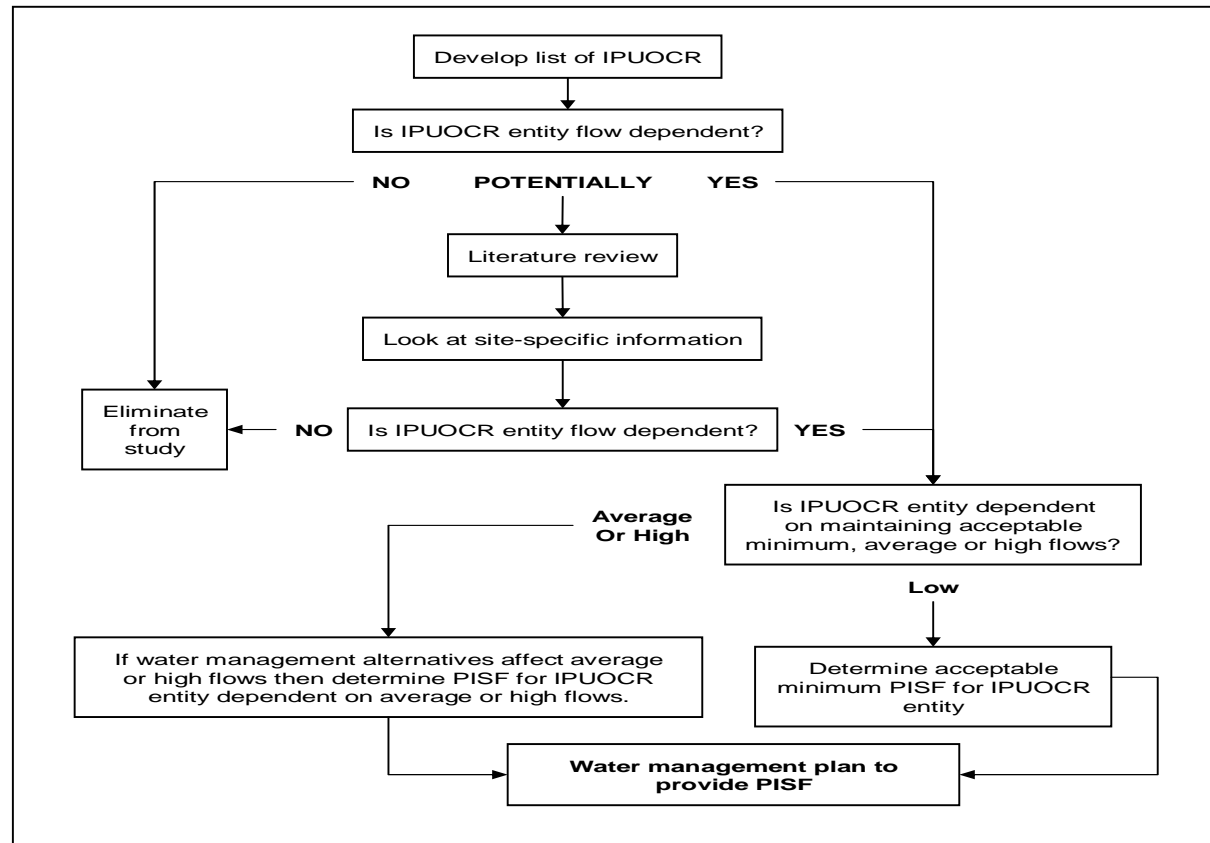
- **The consultant will produce a draft report describing the results of the IPUOCR entities research and on-stream survey.**
- **The draft report will be submitted to the committees for review and comment.**
- **Next step is to propose methods to determine flow needs for flow dependent entities**

On-Stream IPUOCR Survey

- Create GIS Maps
- Survey August 23,25,26, 2005
- Photo Documentation
- Record Hydro-morphological
and Habitat Features
- Develop IPUOCR GIS Layers
and confirmed lists



IPUOCR Flow Dependence



Flow dependent resources

- Recreation (swim/boat)
- Water Storage
- Pollution Abatement

- Floodplain forests
- Oxbow/backwater wetlands
- Vernal pools
- High energy riverbanks
- River rapids

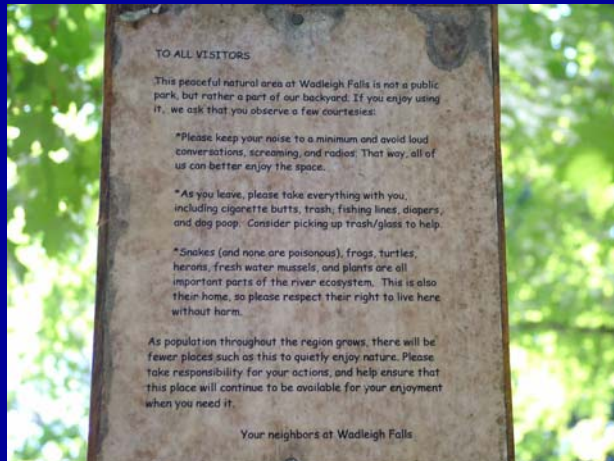
RTE Plants

- Water marigold
- Sharp-flowered mannagrass
- Knotty Pondweed
- Blunt Spheopholis
- Small-crested Sedge
- Slender Blue Flag
- Climbing Hempweed

RTE Wildlife

- Wood Turtle
- Spotted Turtle
- Blanding's Turtle
- Pied Billed Grebe
- Osprey
- Bald Eagle
- Sedge Wren
- Fish and Fish Habitat
- Mussels
- Insects
- T/E Bridled Shiner
- Banded Sunfish
- Endangered Brook Floater
- Public Water Supply
- Groundwater

Recreation



- IPUOCR is swimming, kayaking , canoeing and rowing
- Flow dependent at average to high flows
- Many non-impounded reaches not navigable at low flow
- Evaluated if water management plan alternatives influence average to high flows

Water Storage



- **Storage above Wiswall used by Durham for drinking water**
- **Interview with Durham and review of records to determine flow needs**

Pollution Abatement



- **1 permitted discharge at Epping above designated reach**
- **Permits, waste load allocation studies and regional wastewater alternative reports reviewed**

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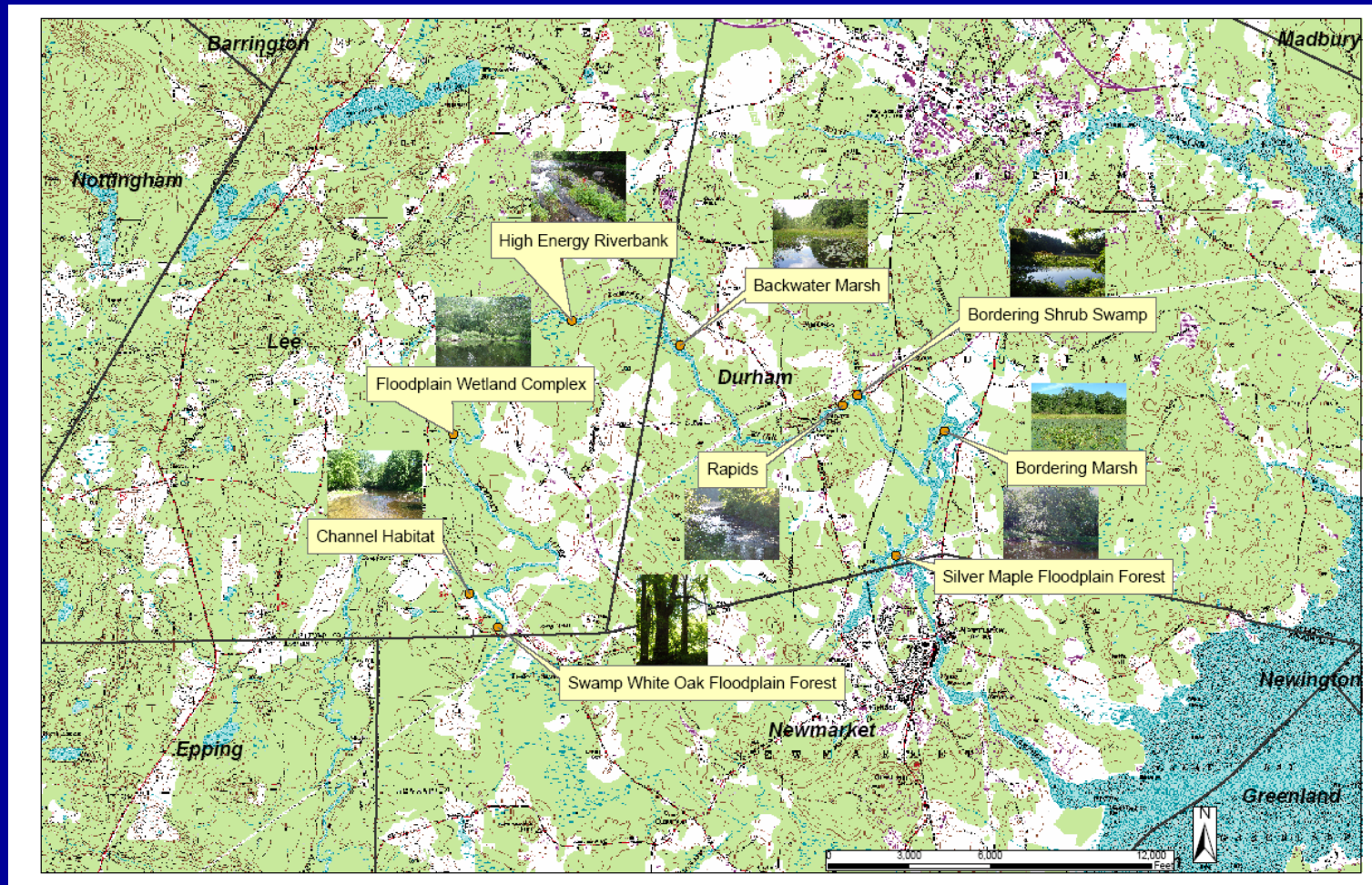
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Wildlife Habitat and Plant Communities



Oxbow/Backwater Wetlands



- **Bordering wetlands along channel, in backwaters and oxbows**
- **Emergent and Floating-leaved marshes; shrub swamps; forested alluvial swamps**
- **Dependent on seasonal water levels determined by flow and/or dam control of water levels**

Floodplain Forests



- Exemplary Swamp White Oak Floodplain Forest at Tuttle Swamp
- Silver Maple and Red Maple floodplain forests
- Vernal Pools
- Spring flows critical

High Energy Riverbanks and Rapids

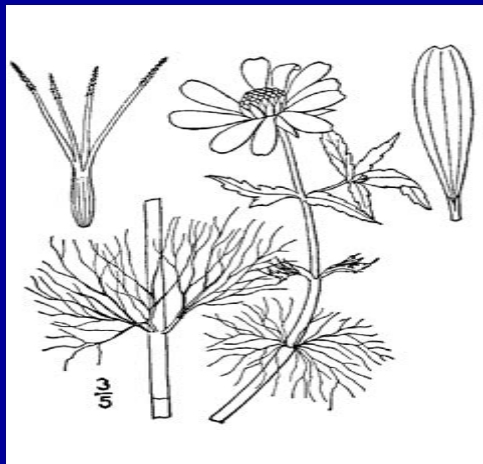


- **Near dams and other rapids**
- **ice and flood scour, seasonal flow changes**
- **unique assemblages of plants**

Plants



RTE Plants



•USDA-NRCS
PLANTS
Database /
Britton, N.L., and
A. Brown. 1913.
*Illustrated flora
of the northern
states and
Canada*. Vol. 3:
500.

- **Knotty Pondweed** locally abundant in reaches with moderate flow
- **Water Marigold** locally abundant in quiet waters near Moat Island area
- **Several listed species have not been confirmed since 1942**

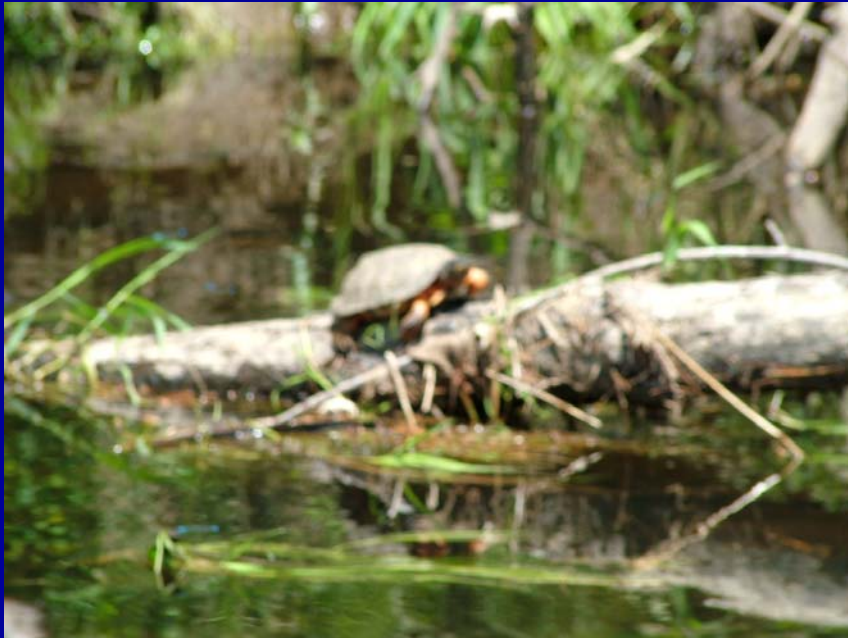
Reptiles and Amphibians



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Turtles



- **Wood Turtle riparian habitat - upper designated reach**
- **Blanding's and Spotted Turtles - floodplain wetland complexes**
- **Musk, Eastern Painted and Snapping Turtles**
- **Critical overwintering and feeding habitat**

Birds



Birds and Bird Habitat



- **Wetland-dependent birds, including waterfowl and waders**
- **Piscivorous raptors – eagles and osprey (RTE species)**
- **flow-dependent browse and prey**

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- **Fish and Fish Habitat**
- **Mussels**
- **Insects**
- **T/E Bridled Shiner**
- **Banded Sunfish**
- **Endangered Brook Floater**

- Public Water Supply
- Groundwater

Freshwater Mussels

- Six of nine species
- State listed Brook Floater reported
- Triangle Floater suggested as possible
- Habitat stability



LIFE CYCLE OF EASTERN ELLIPTIO (*Elliptio complanata*)



After Burch (1975) and Pennak (1978)

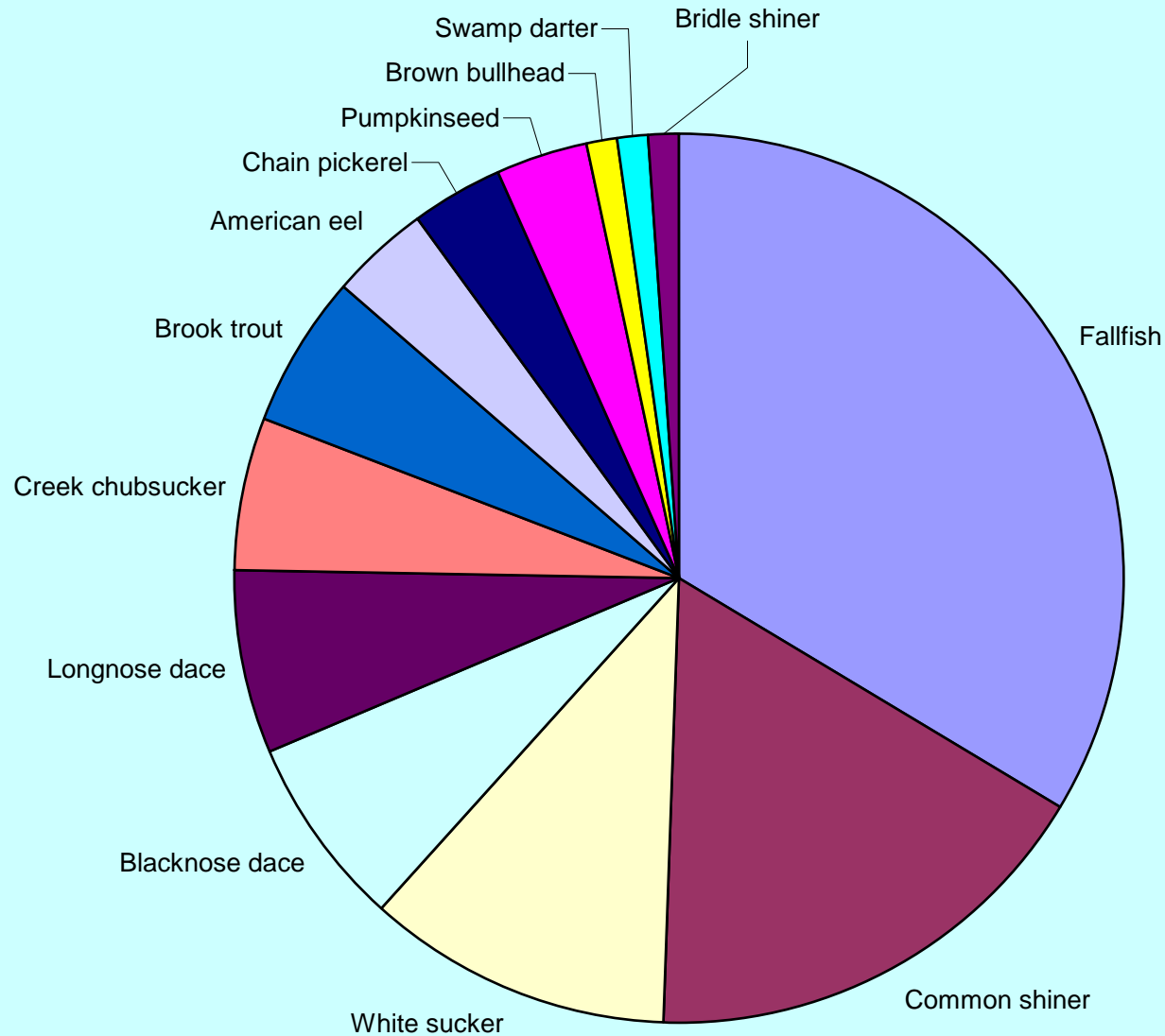
Fish

- Resident native
 - Fallfish
 - Blacknose Dace
- Diadromous fauna
 - Atlantic Salmon
 - American Eel
 - Sea Lamprey
- Endangered
 - Banded Sunfish
- Spawning
- Juvenile



LAMPREY RIVER BASELINE FISH SAMPLING

AUGUST 25-29, 2003



Insects

- Dragonflies and damselflies
- Ringed bog haunter (?)
- EPT taxa
- Snails
- Seasonal flow and substrate needs



Flow dependent resources

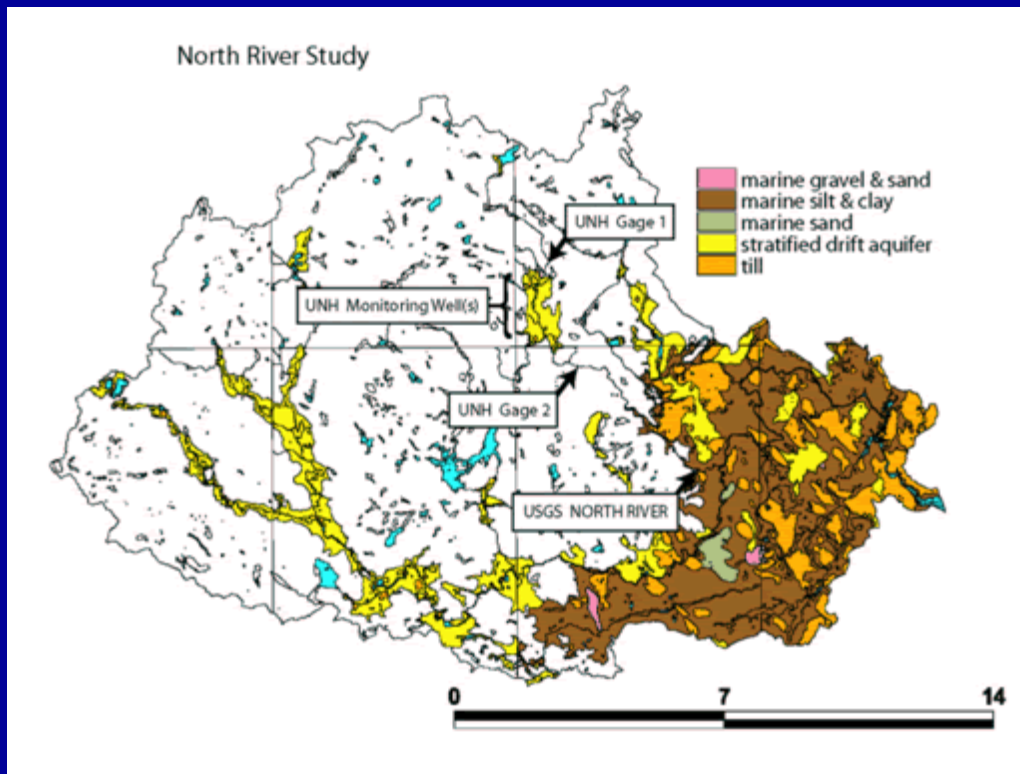
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- Small-crested Sedge
- Slender Blue Flag
- Climbing Hempweed
- Emergent Wetlands
- Swamp white oak floodplain forest, oxbow marsh, floodplain vernal pool, floodplain forest, oxbow shrub-swamp, high energy riverbank, river rapids
- Fish and Fish Habitat
- Mussels
- Insects
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- **Public Water Supply**
- **Groundwater**

Public Water Supply



- **Durham withdraws water from above Wiswall Dam**
- **Newmarket has a surface water withdrawal**
- **Potential well sites for Lee and Newmarket along designated reach**

Groundwater Resources



M. Davis, UNH

- Stratified drift aquifers (sand & gravel)
- Drinking water sources (Raymond, potentially Epping, Durham, and Newmarket)

Affected Water Users and Affected Dam Owners



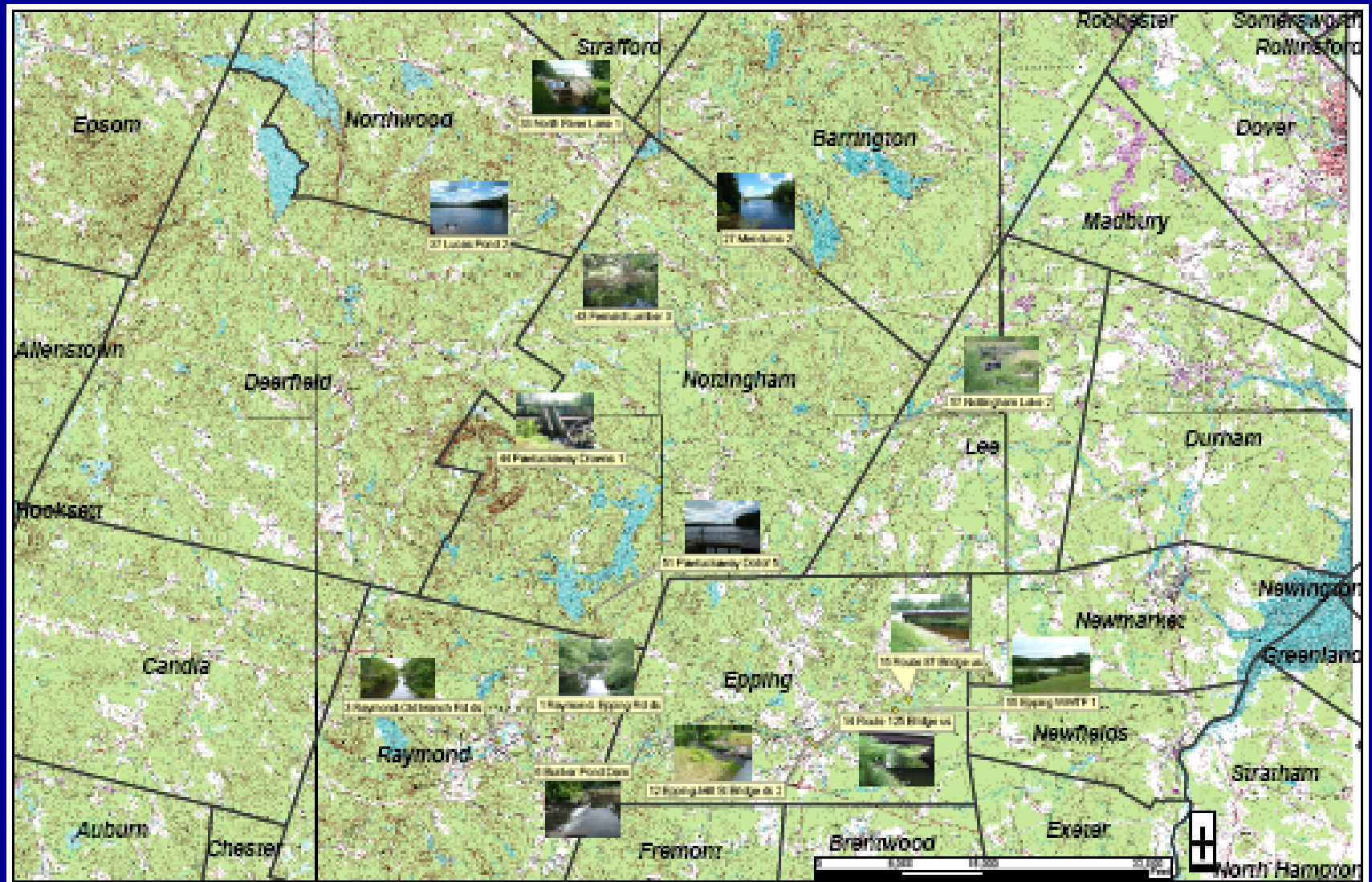
Affected Water Users

- **Epping Water Works**
- **Newmarket Water Works**
- **Raymond Water Department**
- **University of New Hampshire**
- **Pennichuck Water Works**
- **Epping WWTF**
- **Fernald Lumber**
- **Scenic Nurseries, Inc**

Affected Dam Owners

- Socha Dam
- Freeses Pond Dam
- Beaver Pond Dam
- Thurston Pond Dam
- Wiswall Dam
- Bunker Pond Dam
- Hoar Pond Dam
- Piscassic Ice Pond Dam
- Lucas Pond Dam
- Meadow Lake Dam
- Woodmans Marsh Dam
- Dole Marsh Dam
- Mendums Pond Dam
- Pawtuckaway Lake
(Dollof, Drowns,
Drowns dike, Gove
dike)
- North River Pond Dam
- Nottingham Lake Dam
- Deer Pond Dam
- Burnhams Marsh
- Onway Lake Dam

Dams and Water Users



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